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A
T R E A T I S E
concerning the
I N F L U E N C E
of the
S U N and M O O N
upon
H U M A N B O D I E S,
and
the D I S E A S E S thereby produced.

B Y
R I C H A R D M E A D,
Fellow of the Royal Colleges of Physicians at *London*
and *Edinburgh*, and of the Royal Society,
and Physician to His Majesty.

Translated from the *Latin*, under the Author's Inspection,
By T H O M A S S T A C K, M. D. F. R. S.

Rationalem puto medicinam esse debere; instrui vero ab evidentibus causis, obscuris omnibus non a cogitatione artificis, sed ab ipsa arte rejectis. Cels. in Præfat.



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HAVING resolved, at the instance of some friends, to give a second edition of this small Treatise, I thought it incumbent on me, to read it over attentively ; in order to make such additions and improvements, as above forty years experience might have suggested to me since its first publication. Accordingly, in this review, I have explained some mathematical matters in a clearer manner than I had formerly done ; and I have illustrated and confirmed the medicinal part by several additional observations and cases, which may prove useful in the practice of physic. And indeed, that a due consideration of this subject is extensively

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useful to a physician, will appear with sufficient evidence, from the various kinds of diseases, the courses and returns of which I have herein shewn to depend on the different positions and revolutions of the Sun and Moon. Now, though a previous acquaintance with the *Mathematical principles of natural philosophy* be requisite for comprehending this subject in its full extent; yet as those, who are little affected by geometrical demonstrations, may possibly be convinced by a number of facts, I shall not, with respect to this little work, insist on that saying of *Plato* :

ΟΥΔΕΙΣ ΑΓΕΩΜΕΤΡΗΤΟΣ ΕΙΣΙΤΩ.

Let none unskilled in geometry enter here.

London,
July 1. 1746.

P R E F A C E



P R E F A C E.

AS the study of physic has in all ages undergone various changes, according to the different opinions of philosophers ; I have often wondered, how it comes to pass, that, notwithstanding the considerable advances made in the study of nature by the moderns, especially in the last century, this useful art has not received those benefits, which might reasonably be expected from a surer method of reasoning, than men were formerly acquainted with. That some of the moderns, particularly Galilei, Kepler, Torricelli, and

and Sir Isaac Newton, have made vast improvements in natural philosophy, by joining mathematical reasonings to their inquiries into nature, is well known to the learned world: and yet medicine still deals so much in conjecture, that it hardly deserves the name of a science. Whether this be owing to the nature of the art, as being incapable of sure principles; or rather, to the artists, who having got into a wrong track, will not take the pains to return into the right road; may possibly be a matter of inquiry on some other occasion. In the mean time, in order to prove, how beneficial the study of geometry must be to physicians, as well for investigating the causes of diseases, as for finding proper remedies for them; I have attempted to explain a very difficult question, concerning the courses and returns of some distempers;

pers ; the nature of which is such, that it cannot be thoroughly well handled by any other means.

THUS I am necessitated, in this disquisition, to enter into a few more minute calculations, than a medical subject might seem to require. Wherefore the reader ought to have some knowledge of Sir Isaac Newton's philosophy ; or at least, understand the learned and sagacious Dr. Halley's Theory of the Tides, upon the principles of that great philosopher, as published in the Philosophical Transactions. And those, who have no taste for mathematical studies, may, if they please, pass over this part of the work. For my part, I never expect to acquire reputation by algebraical calculations, thoroughly sensible of the mediocrity of my genius in that branch of learning. But I flatter

flatter myself, that these sheets will be found to contain some histories and instructions, from which even those, who despise all reasoning in physic, and rely on experience alone, will reap benefit in practice: which indeed is the main design of this little Treatise.

THE field is large, in which we run our career; nor are the innumerable evils, with which we are daily surrounded, to be remedied by any one method. The two great pillars of medicine are experience and reason; and he that has no confidence in the latter, at least bids the fairer towards relieving the sick, in proportion to his stock of the former. But yet the business of our profession requires the joint assistance of both; because a rational theory will teach a man to apply
his

his experimental knowledge to the various cases that occur.

FOR although a very few remedies, found out by chance, and confirmed by use, might possibly have been sufficient for curing the disorders of men in the earliest times, who, we are told, led sober and active lives ; yet in succeeding ages, when their constitutions had been injured by sloth and luxury, they stood in need of different methods of cure : inasmuch as it now became necessary to inquire, not only into the cause of the distemper, but also how its nature and usual appearance had been changed in this or that individual. Hence that saying of Hippocrates (a) : the physician should have an eye

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to

(a) Epidem. lib. i.

to things common and peculiar : *because, as Celsus rightly observes,* there are cases, in which the same disorder puts on a different appearance from that, which it usually has ; and the discovery of the cause is sometimes the cure of the distemper (b).

AND it is probable, that the only reason, why the profession of physic lay buried in total darkness for near five hundred years, that is, from the Trojan to the Peloponnesian war, as Pliny has recorded (c) ; was, that, whereas new diseases started up from time to time, and those, who had nothing but experience to make them physicians, were unequal to these new difficulties ; the philosophers
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(b) In præfat.

(c) Lib, xxix. in præfem.

engrossed the art, which was found to be lame and infirm without the knowledge of nature. Thus Celsus says of that same space of time, that the science of physic was accounted a part of philosophy ; so that the curing of diseases, and the contemplation of nature, took their rise from the same persons (d).

*Now, as it is of consequence to the subject in hand, so it is easy to prove, that those philosophers, who laid the first foundations of our art, were really famous geom-
etricians. And first, the most eminent among the sages of anti-
quity was Pythagoras, who had acquired such high reputation for his skill in physic, that it was*

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com-

(d) Loco citato.

commonly said, that he travelled, not so much for the sake of instructing people, as of curing them (e). But the progress made by him in mathematical studies also was extraordinary. Witness his two noble discoveries; the one, Of the square described upon the side subtending the right angle in a right-angled triangle, being equal to both the squares described upon the sides containing the right angle; the other, Of the area of the parabola, which, according to Proclus (f), he first demonstrated. For the first of these problems, Athenæus (g) and Diogenes Laertius (h), upon the authority of Apollodorus the arithmetician, say,
that

(e) Aelian. var. Hist. lib. iv. cap. 17.

(f) Lib. iv. ad primum Euclid.

(g) Lib. x. pag. 418.

(h) In vita Pythagoræ, lib. viii. segm.

that he offered a hecatomb in sacrifice. But Plutarch (i), after citing a verse of Apollodorus, leaves it doubtful for which of the two he made that offering.

EMPEDOCLES was his disciple in Italy, a person of a vast genius, who, having penetrated into nature's inmost recesses, performed such great things in our profession, as were not to be expected from a bare experimental knowledge of physic. For when his native city Agrigentum was infected with a dreadful plague, he soon found out the cause; and thereupon, by stopping up some openings in the mountains, thro' which unwholesome winds issuing brought the contagion, he averted the evil

(i) Quod ne vivere jucunde quisquam possit, qui sectam sequatur Epicuri.

vil (k). *He rendered the same service to the Selinuntians: for when they were seized with a plague from the corruption and stench of the stagnating waters of a river, which furrounded the city; he ordered two neighbouring rivers to be conveyed into it: by which means, having made a current, and cleansed the channel, the waters gradually grew sweet, and the plague ceased (l). Now these facts are the more worthy of being recorded; because the ancients were generally of opinion, that pestilence proceeded from the anger of the gods, and therefore was not to be cured by natural remedies: whereas in both these cases, the remedies were pointed out by mechanical*

(k) Idem, de curiositate, & Lib. contra Coloten.

(l) Vid. Diog. Laert. lib. viii. segm. 70.

mechanical reasoning ; and that calamities of this kind are owing to such causes, is confirmed by a great number of observations published by various authors.

DEMOCRITUS, who is thought by some to have been Hippocrates's master, was equally famous for geometry and physic. For he is said to have written, among other things, Of the contact of the circle and sphere ; Of geometry ; Of incommensurable lines : as also Of the nature of man ; Of the humors ; and Of plagues (m).

By those great men, and others like them, was this profession carried on to the time of Hippocrates ; who, as Celsus says, was the first that

(m) Idem in vita Democriti, lib. ix. segm. 46 & 47.

that separated this art from philosophy (n). For he, plainly perceiving, that the superstition of the common people, the impudence and vain pretences of quacks, and the pride and vanity of the sophists, were mighty obstacles to the improvement of the art ; proposed to himself in all his writings, to guard against those impediments and difficulties. And accordingly, in his valuable book *De morbo facro*, he teaches how to obviate false religious notions : and is very copious in detecting the frauds and fallacies of those men, who covered their ignorance with a veil of piety, making profession of charming away those diseases, which they could not cure by medicines. In his books *De arte*, *De decoro*, *De*
præ-

(n) In præfatione.

præceptionibus, he disputes, not only against those, who denied that physic was an art, and therefore had no regard to any thing but experience; but also against those, who practised upon a wrong plan. And because the divine old man is made a tool by contending parties for their respective notions; I cannot avoid observing, that mechanical reasoning is every where approved and recommended in those treatises by that great parent of medicine. For he says: I praise reasoning, when it is grounded on such principles as fall under our senses, or are proved by experiments; and draws conclusions from manifest premises. But if it is carried on by unjust deductions, and is built upon fictitious opinions, it occasions great trouble and difficulties (o). And

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(o) Lib. de præcept.

this sentiment is illustrated and confirmed in his book De prisca medicina : where after saying, that most physicians are very like unskilful pilots, whose ignorance of their art is not discovered, while the vessels sail in good weather before the wind ; but if a storm arise, then it soon appears, that their blunders were the cause of the shipwrecks, which happen : he tells us, that our chief care should be to learn the properties of things, not by imagining or contriving, but by finding out the powers, which they are endowed with, and exercise on our bodies ; in which inquiry great regard must be paid, both to the qualities of the humors, and to the figures of the parts : some of which from a wide beginning run into a narrow apex, others are more and more

more expanded ; some are smooth and cylindrical ; some dense or firm, others in fine thin and lax. *This is the wisdom, which ought to accompany the study of medicine ; by means of which he says, the artist becomes equal to the gods (p).*

BUT I shall enlarge no farther at present on this theme. However it manifestly appears from what has been hitherto said, that Hippocrates gave the name of sophists (q) to those, who argued on fictitious principles ; and that of real physicians (r) to those, who reason from the laws of nature, and a knowledge of the animal fabric. Which I observe for the sake of those, who, as if there was no difference be-

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tween

(p) Lib. de decoro.

(q) Σοφιστὰς.

(r) Ἐργῶ ἰητρῆς.

tween the groundless hypotheses of philosophers, and the certain conclusions of geometricians, hold this most useful science in contempt, and even turn it into ridicule before the ignorant multitude. But surely these apply themselves both to philosophy and physic, without having any genius to either; for want of which they cannot discern the wide distance between sophistical opinions and geometrical reasonings. For he, who builds an hypothesis, follows plausibility, and thinks it sufficient, if he can account for appearances from his principles: whereas mechanical theory deals in demonstrations, which the able geometrician deduces either from the figures of bodies, or from the known laws of motion, by necessary consequences.

EXAMPLES

EXAMPLES *will set this matter in a clearer light.* Des Cartes *compiled a set of suspicions and conjectures on the gravity of bodies, and yet made no proficiency thereby in the knowledge of nature: but* sir Isaac Newton, *by pursuing its laws in a geometrical manner, without any regard to the cause, laid open to our contemplation the real fabric of the world.* Doctor Willis *invented an idea of soporiferous diseases; from which we learn, that the author had words at will, but knew nothing of the nature of those diseases: whereas* Bellini, *by bringing their history and symptoms under mechanical reasonings, paved the way to the knowledge and cure of those great evils.* But enough of this subject.

W H E N

WHEN I had communicated my intention of publishing this piece to my friend the celebrated dr. Pitcairne, he not only applauded my design, but, of his great humanity, readily sent me some histories of periodical diseases out of his large stock. Those I have ranged in their proper places, as considerable ornaments to my little book, not without a sense of pleasure, in seeing my opinion confirmed by the testimony of so great a master in these studies; and the rather, because it was proper to produce the observations of others, as well as my own, in support of this new theory. And I may not conceal in this place, that our dissertation displays, not a little, the wisdom, goodness, and wonderful contrivance of
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the omnipotent Creator of the world; who, while he made ample provision for all living things, established this difference between brutes and rational creatures; that whereas those enjoy the common gifts of nature, he has permitted us, besides, to investigate their properties and uses, and to contemplate the labyrinth of his divine works.

LASTLY, I have but lightly touched upon the cure of the cases related in this treatise; because I intend, whenever I find sufficient leisure, to publish the most remarkable observations, which I have already, or may hereafter make on most diseases.

London,
A. D. 1704.



A
T R E A T I S E
concerning the
I N F L U E N C E
of the
S U N and M O O N
upon
H U M A N B O D I E S, &c.

C H A P. I.

That the sun and moon cause various alterations in the human body, according to their different positions with respect to the earth.

IT was the general opinion of the ancient physicians, that some diseases are entirely owing to the influence of the celestial
D bo-

2 *Influence of sun and moon*

bodies, and that the paroxysms and periods of others are regulated by the action of the moon in particular : wherefore the earliest histories of Epidemics, which have been handed down to us, are full of the motions and powers of those luminous orbs. Upon this principle it is, that *Hippocrates* advises his son *Theſſalus* to the study of numbers and geometry (a) : because, ſays he, *the riſing and ſetting of the ſtars have a great effect on diſtempers* (b).

BUT when in courſe of time medicine began to be accommodated to the reaſonings of philoſophers ; no body being able to account for the manner of this celeftial action, and the rule of obſervation being gradually laid aſide,
it

(a) *Epist. ad Theſſalum.* (b) *De aëre, aquis, et locis.*

it was allowed no farther share in affecting our health, than what might be imputed to the changes in the manifest constitution of the air : excepting perhaps something of truth, which still remains disguised and blended with the jargon of judicial astrology.

IN order therefore to set this obscure and difficult matter in a little clearer light, I shall in the first place endeavour to shew, that the sun and moon, regarding their nearness and direction to the earth only, besides the effects of heat, moisture, &c. thereby caused in our atmosphere, must at certain times make some alterations in animal bodies ; then enumerate some histories and observations of such changes, and inquire of what use such thoughts as these may be in the practice of physic.

4 *Influence of sun and moon*

IT is a constant observation of those, who have written the history of the *winds*, that the most windy seasons of the year are the times about the vernal and autumnal equinox. Every body likewise knows, that in the most quiet weather there is generally some breeze at mid-day and mid-night, as also at full sea, that is, always about the time when the sun or moon arrives at the meridian, either over or under our hemisphere. Seamen and country people reckon upon this, and order their affairs accordingly. And the changes of the weather, as to winds or calms, especially about the new and full moon, are too well known to require any authority to confirm such remarks. Those, who desire a fuller account of these observations, may see it in *J. Goad's astro-meteorologia*

meteorologia (c). These things being matters of fact, and in a manner regular and universal, it may very well seem strange, that philosophers have not been more accurate in their inquiries into the reason of such appearances. True indeed it is, that the origin of winds is various and uncertain; but however, so constant and uniform an effect must undoubtedly be owing to one necessary cause.

It has been, now a considerable time since, sufficiently made out, that our atmosphere is a thin elastic fluid, one part of which gravitates upon another, and whose pressure is communicated every way in a sphere to any given part thereof. From hence it follows, that if by any external cause the gravity of
any

6 *Influence of sun and moon*

any one part should be diminished, the more heavy air would rush in from all sides around this part, to restore the equilibrium, which must of necessity be preserved in all fluids. Now this violent running in of the heavier air would certainly produce a wind, which is no more than a strong motion of the air in some determined direction. If therefore we can find any general cause, that would, at these stated seasons, which we have mentioned, diminish the weight or pressure of the atmosphere; we shall have the genuine reason of these periodical winds, and the necessary consequences thereof.

THE flux and reflux of the sea was a phænomenon too visible, too regular, and too much conducing to the subsistence of mankind, and all other animals, to be neglected
by

by those, who applied themselves to the study of nature: however all their attempts to explain this admirable contrivance of infinite wisdom were unsuccessful, till sir *Isaac Newton* revealed to the world juster *principles*; and by a truer philosophy, than was formerly known, shewed us how, by the united or divided forces of the sun and moon, which are increased and lessened by several circumstances, all the varieties of the tides are to be accounted for. And since all the changes, we have enumerated in the atmosphere, do fall out at the same times, when those happen in the ocean; and likewise whereas both the waters of the sea, and the air of our earth, are fluids subject, in a great measure, to the same laws of motion; it is plain, that the rule of our great philosopher takes place here, *viz. that natural*

8 *Influence of sun and moon*

tural effects of the same kind are to be attributed, as much as possible, to the same causes (d).

WHAT difference that known property of the air, which is not in water, makes in the case, I shall shew anon. Setting aside the consideration of that for the present, it is certain, that as the sea is, so must our air, twice every twenty five hours, be raised upwards to a considerable height, by the attraction of the moon coming to the meridian ; so that instead of a *spherical*, it must form itself into a *spheroidal* figure, whose longest diameter, being produced, would pass thro' the moon. That the like raising must follow, as often as the sun is in the meridian of any place, either above or below the horizon ;

(d) *Newton. Princip. pag. 387.*

horizon ; and that the moon's power of producing this effect exceeds that of the sun, in the proportion of $4\frac{1}{2}$ to 1 nearly. Moreover, that this elevation is *greatest* upon the new and full moons, because both sun and moon do then conspire in their attraction ; *least* on the quarters, in that they then drawing different ways, it is only the difference of their actions that produces the effect ; lastly, that this intumescence will be of a *middle degree*, at the time between the quarters, and new and full moon. The different distances of the moon in her *perigæum* and *apogæum*, likewise increase or diminish this power. Besides, the sun's lesser distance from the earth in winter is the reason, that the greatest and least attraction of the air upwards more frequently happens a little before the vernal, and

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after

10 *Influence of sun and moon*

after the autumnal equinox. And in places, where the moon declines from the equator, the attraction is greater and lesser alternately, on account of the diurnal rotation of the earth on its axis.

WHATEVER has been said on this head, is no more than applying, what sir *Isaac Newton* has demonstrated of the sea, to our atmosphere; and it is needless to shew, how necessarily those appearances, just now mentioned of winds, at the stated times, must happen hereupon. It will be of more use to consider the proportion of the forces of the two luminaries upon the *air*, to that which they have upon the waters of our globe; that it may the more plainly appear, what influence the alterations hereby made must have upon the animal body.

SIR

SIR *Isaac Newton* has demonstrated, (e) that the force of the sun to move the sea, is to the force of gravity, as 1 to 12868200. Let this be

$$S : G :: 1 : n. \quad \text{Hence, } S = \frac{G}{n}.$$

And that the force of the moon to raise the sea is to gravity, as 1 to 2871400. Let this be

$$L : G :: 1 : s. \quad \text{Hence, } L = \frac{G}{s}.$$

And since the centrifugal force of the parts of the earth, arising from its diurnal motion, is to gravity, as 1 to 289; let this be

$$C : G :: 1 : e. \quad \text{Then } C = \frac{G}{e}.$$

E 2

Hence,

(e) *Princip. Lib. iii. Prop. 36. & 37.*

12 Influence of sun and moon

Hence,

$$S+L:C :: \frac{G}{n} + \frac{G}{s} : \frac{G}{e} :: \frac{I}{n} + \frac{I}{s} : \frac{I}{e} ::$$

$$1 : \frac{sn}{s+ne} :: 1 : 8123.$$

THE same philosopher has taught us, that the centrifugal force raises the water at the equator above the water at the poles, to the height of 85472 feet (*f*). Wherefore if that force, which is as 8123, raises the ocean to 85472 feet; the united forces of the sun and moon, which are as 1, will raise the same to 10 $\frac{1}{2}$ feet:

$$\text{for } \frac{85472}{8123} = 10 \frac{1}{2} \text{ nearly.}$$

Now,

(*f*) *Ibid. Lib. iii. Prop. 37.*

Now, we know that the more easily the water can obey the attraction, with the more force are the tides moved: but since, as the sagacious dr. *Halley* has determin'd it, our atmosphere is extended to forty four miles, whereas the middle depth of the ocean is but about half a mile; it is plain, that the air, revolving in a sphere about a hundred times larger than that of the ocean, even supposing the whole terrestrial globe covered with water, will have a proportionably greater agitation. Besides rocks, shelves, and the inequality of shoars are a great stop to the access and recess of the sea: but nothing repels the rising air, which is also of such thinness and fluidity, that it is easily driven, and runs every way.

14 *Influence of sun and moon*

NOR ought we to omit, that it is the universal law of bodies attracted, that the force of attraction is reciprocally as the squares of their distances; so that the action of the sun and moon will be greater upon the air, than upon the water, upon the account of greater nearness. But the consideration of the elasticity is still of greater moment here; of which this is the nature, that it is reciprocally as the pressure: so that the incumbent weight being diminished by the attraction, the air underneath will upon this score be mightily expanded. True it is indeed, that this pressure diminishes gradually, in such sort, that it is of no moment beyond a certain distance from the earth: but yet a small alteration therein produces a very considerable effect; because there-
by

by our ambient air the more readily yields to the attractive faculty.

THESE and such like causes will make the tides in the air from the moon's attraction, to be much greater than those of the ocean. Nor is it necessary to our purpose to determine, by nice calculations, their particular forces: it is sufficient to have proved, that these motions must both be universal, and also return at certain intervals.

Now, since the raising of the water of the ocean to ten feet and a half, produces torrents of such a prodigious force; we may easily conceive what tempests of winds, if not otherwise checked, the elevation of the air much higher, perhaps above a mile, will necessarily cause. And there is no doubt to be made, but that the same infinitely

16 *Influence of sun and moon*

nitely wise being, who contrived the flux and reflux of the sea, to secure that vast collection of waters from stagnation and corruption, which would inevitably destroy all the animals and vegetables on this globe; has ordered this ebb and flood of the air of our atmosphere, with the like good design; that is, to preserve the sweet freshness, and brisk temper of this fluid, so necessary to life; and keep it, by a kind of continual circulation, from deadness and stinking. We daily feel the benefits of this wonderful contrivance; but I cannot find, that the manner of it has been hitherto accounted for. And yet no subject better deserved the serious consideration of physicians: since it has been observed, that people recover speedily from wasting chronic diseases in clear open air; and

and that the best constitutions are very liable to sickness in moist close places.

THIS reasoning is liable to only one objection, that I know of, which is this: that the appearances, we have mentioned, cannot be owing to the causes now assigned; since by calculation from them, the mercury must at new and full moon subside in the barometer to a certain degree; which yet barometrical writers do not observe to happen. *Ramazzini* in particular expresses his surprize on this head, thinking it reasonable to suppose, that *as the tides in the ocean are observed to be greater at those times, than at any other time of the moon, on account of the influence, which this planet is thought to have on the sea; so likewise some remarkable change ought to appear in the gra-*
F vity

vity of the atmosphere. But yet, says he, nothing of this kind has happened, worth mentioning : for through the whole course of this year there was little or no difference in the height of the mercury at the new and full moons, with respect to the preceding and subsequent days ; nor indeed during all the times of its darkness (g).

IN answer to which, it may not be amiss to inquire into the cause of the rise and fall of the quicksilver in the barometer, which does not seem to have been cleared up by writers on this subject. First then it is certain, that this heavy fluid is raised by the pressure of the incumbent air, and that the pressure of this element is in proportion to its gravity : which as it is
the

(g) *Ephemerid. baromet. Mutinens. ann. 1694.*
p. xix.

the greater, the more air is contained in the column directly impending on the quicksilver; whatsoever increases or diminishes this quantity of air, will make the quicksilver rise or fall in the tube. Hence it is, that winds occasion very considerable changes in the weather-glass; according as they rarefy or condense the air in this column. Thus between the tropics, where the trade-winds reign, which are moderate gales, constantly blowing from the same quarter for several months together, the variations of the barometer are very inconsiderable, as dr. *Halley* has observed (*b*); whereas in northern latitudes they are considerable, and indeed more so than in southern latitudes: because storms are more common in the

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former,

(*b*) *Phil. trans.* N^o 181. p. 111.

20 *Influence of sun and moon*

former, than in the latter ; and at those times, which are most subject to winds, the mercury varies almost every hour : as *Ramazzeni* has observed about the equinoxes. *For about these*, he says, *I have observed remarkable variations, and especially at the autumnal equinox, when the quicksilver rose and fell several lines in one day ; whereas in the solstices it kept the same station as the foregoing days (i).* But yet, let the air be raised ever so high at the new and full moon, it cannot possibly happen, that the mercury should constantly subside in all places at those times : because such is the known property of winds, that those, which carry off and rarefy the air in one place, crowd it in, and condense it in another.

THIS

(i) *Lib. citat. pag. xxx.*

THIS matter thus far explained, it will not be improper to subjoin the solution of a difficult question, which has raised great contention among philosophers: *viz.* whereas water is more than eight hundred times heavier than air, how does it happen, that the latter, when replete with watery vapors, depresses the mercury in the barometer; so that its fall is an indication of rain? Now this phænomenon seems to me to be chiefly owing to the following causes. Water is so entirely void of elasticity, that no force can compress it into a narrower compass; and at the same time, a boiling heat divides it into such minute particles, as to make it occupy fourteen thousand times more space, than it naturally takes up (*k*). This vapor, more
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(*k*) See Desaguliers's course of experimental philosophy, vol. ii. lect. x.

22 *Influence of sun and moon*

than sixteen times thinner than our air, is so subtle, that it is easily retained by the particles of the air, and unites with them, much in the same manner, as the very small parts of metals, dissolved in some acid liquors, are suspended by them. For it is well known, that the more minutely bodies are divided, the more surface they acquire in respect to their bulk. Besides, the air, which we breathe, contains a vast number of particles heavier than water, I mean the exhalations from minerals, animals and vegetables, and in a word from all the productions of the earth. But perhaps what is of greatest moment in this case, is the quality of the particles exhaled from the earth, which are chiefly sulphureous. For it has been found by experiments, that the
fumes

fumes from sulphur are so contrary to elasticity, that they quite destroy it (1). Now, sir *Isaac Newton* has shewn, that almost all bodies contain sulphur: and the phænomena of lightning and thunder shew, that the atmosphere is full of it. Wherefore these reasons sufficiently prove, that moist air has less power to act than dry air. When these very subtile watery vapors, by their attractive and repulsive qualities, have run into one another, and formed drops; they thereby become heavier than air, and fall to the earth in the form of rain: and then the air, freed from these vapors, acts with greater force, and raises the mercury in the barometer.

BUT

(1) See Hales's *statical essays*, vol. 1. p. 230. and 299.

BUT to return ; the winds are produced by so many different causes, that a person would find himself greatly mistaken, who would attempt to account for them all upon any one principle.

WHEREFORE to those already explained, we may add that constant cause of the motion of the air, I mean the heat of the sun. For as dr. *Halley* (*m*) has demonstrated, that the trade-winds, which reign between the tropics, owe their rise to it ; so it is most certain, that it may occasion various motions of the air in every part of the terraqueous globe. Moreover, we know that there sometimes happen violent tempests in the upper regions of the air, while we enjoy a calm below ; and that the ridges
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(*m*) *Phil. transf.* N^o 183.

of mountains check the propagation of the winds in many places: so that it is no wonder, that the phænomena of the changes of the air, which we have ascribed to the action of the moon, are not always constant and uniform. Now the chief causes of uncertain and irregular winds are these. First, elastic vapors forced from the bowels of the earth, by subterraneous heats, and condensed by what cause soever in the atmosphere. Secondly, a mixture of *effluvia* of different qualities in the air, may, by rarefactions and fermentations, produce winds, and other effects, like those resulting from the combination of some chemical liquors. And that such things happen, we are assured from the nature of thunder, lightning, and meteors. Thirdly, from the eruptions of *volcano's*, and earthquakes in distant

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tant places, winds may be propagated to remoter countries. Lastly, the divided or united forces of the other planets, and of comets, may variously disturb the action of the sun and moon.

THESE things being premised, it will not be difficult to shew, that these changes in our atmosphere at high water, new and full moon, the equinoxes, &c. must occasion some alterations in all animal bodies ; and that from the following considerations.

FIRST, all living creatures require air of a determined gravity, to perform respiration easily, and with advantage: for it is by its weight chiefly, that this fluid insinuates itself into the lungs. Now the gravity, as we have proved, being lessened at these seasons, a
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smaller quantity than usual will insinuate itself; and this must be of smaller force to comminute the blood, and forward its passage into the left ventricle of the heart: whence a slower circulation ensues, and the secretion of the nervous fluid is diminished.

SECONDLY, this effect will be the more sure, in that the elasticity of the atmosphere is likewise diminished. Air proper for respiration must be, not only heavy, but also elastic, to a certain degree: for as this is by its weight forced into the cavity of the *thorax* in inspiration, so the muscles of the *thorax* and *abdomen* press it into the most minute ramifications of the *bronchia* in expiration; where the bending force being somewhat taken off, and springy bodies, when unbended, exerting

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their power every way, in proportion to their pressures; the parts of the air push against all the sides of the *vesiculæ*, and promote the passage of the blood. Therefore the same things, which cause any alterations in this property of the air, will more or less disturb the animal motions. We have a convincing instance of all this, in those who go to the top of high mountains: for the air is there so pure (as they call it) that is, thin, and wants so much of its gravity and elasticity, that they cannot take in a sufficient quantity of it to inflate the lungs, and therefore breathe with very great difficulty.

LASTLY, all the fluids in animals have in them a mixture of elastic *aura*, which, when set at liberty, shews its energy, and causes those intestine motions, we observe

observe in the blood and spirits; the excess of which is checked by the external ambient air, while those juices are contained in their proper vessels. Now when the pressure of the atmosphere upon the surface of our body is diminished, the inward air in the vessels must necessarily be inabled to exert its force, in proportion to the lessening of the gravity and elasticity of the outward: hereupon the juices begin to ferment, change the union and cohesion of their parts, and stretch the vessels to such a degree, as sometimes to burst the smallest of them. This is very plain in living creatures put into the receiver, exhausted by the air-pump; which always first pant for breath, and then swell, as the air is more and more drawn out: their lungs at the same time contracting themselves, and falling so
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together, as to be hardly discernible, especially in the lesser animals (n).

CONCERNING the weight of the atmosphere on a human body, and its difference of pressure at different times, let this estimate suffice. We will lay it down as certain, that this weight and pressure may be computed from the force, with which the air raises the quicksilver in the barometer. The surface of a man's body, of a middle size, is fifteen square feet, or 2160 inches. The weight of a cubic inch of quicksilver is 8,101, &c. ounces averdupois. Wherefore the pressure of the air on every square inch of the human body, in the ratio of the weight of the quicksilver in the barometer, will stand thus. A column of quicksilver, an

(n) *Esperienze dell' accademia del cimento*, p. 118.

an inch square, can in *England* be raised in the barometer to 30 inches and $\frac{8}{10}$, by the air when heaviest; and it will subside to 28 inches, when the air is lightest. Consequently, the air, when heaviest, will press on every inch of the surface of the human body, with the weight of 15 pounds and 9 ounces; when lightest, with that of 14 pounds 2 ounces avoirdupois. Thus the whole body, in the heaviest air, sustains a weight of about 33684 pounds; in the lightest, of 30622 pounds 5 ounces. Whence the difference of pressure at different times is 3062 pounds nearly. True it is, that the internal air of the human body makes a resistance to that weight: but yet such change of pressure must necessarily have considerable effects; especially when this internal air, through some defect

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fect in the animal fluids, with which it is mixed, is increased or diminished in its natural properties.

BEFORE we proceed to other matters, it may be worth the while to take notice of two things : first, that effects, depending on such causes as these, must of necessity be most visible in weak bodies, and morbid constitutions, when other circumstances concur to their taking place ; while strong bodies and sound constitutions are little affected by them. For this reason, whatever mischiefs do hence follow, cannot in the least disparage the wise contrivance of infinite power, in ordering these tides of our atmosphere. The author of nature has certainly made all things to the greatest advantage, that could be, for the whole

whole system of animals on our globe, altho' such a disposition might in some cases prove prejudicial to a few. The position and distance of the sun are so adjusted, as to give, in the most beneficial manner possible, heat and light to the earth: yet this notwithstanding, the excessive summer heats in some countries may be attended with bad consequences; in others, the winter colds may be so intense, that tender bodies cannot bear them; and in all seasons and climates, changes of weather may give birth to diseases. The whole however, we must own, is most carefully provided for. Besides, as most of these last mentioned inconveniencies are by easy shifts to be avoided; so there are such powerful checks put to this aerial flux and reflux, so many ways of abating the damages accruing from

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it now and then; that these are of no account, in comparison of the mighty benefits hence arising, in which the race of mankind does universally share.

SECONDLY, that the other planets have likewise their peculiar influences; which, tho' inferior to those of the sun and moon, yet contribute various ways towards increasing or diminishing the action of these on human bodies. And these united forces are of such consequence, that violent and occult diseases, with which whole nations are seized, may be certainly attributed to them. And the *θεῖον τι* or *somewhat divine* of *Hippocrates* (o), which he recommends to have regard to in diseases, is most probably nothing more

(o) *Prognostic. i.*

more than the state of our atmosphere, occasioned by the influence of the planets, or some other uncommon and unknown natural cause; as I have more amply explained on another occasion (*p*).

(*p*) See Account of poisons, *essay vi. pag. 300. of the fourth edit.*





C H A P. II.

*Of the diseases, and symptoms,
which derive their origin from the
abovementioned causes.*

I NOW proceed to examine what particular functions of animal bodies are disturbed by these periodical rarefactions of the fluids in their proper vessels: and here I shall not ground my opinion on my own observation alone, but likewise take in the assistance of other medical writers. For there are no histories in physic, which we may more safely take upon the credit of the authors, who relate them, than such as we are now going to mention. In some cases a point may perhaps be strained, to serve a darling hypothesis, which the writer has
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taken up ; but here we are much more likely to have pure matter of fact : because hitherto no one has pretended, that the appearances of this kind are within the reach of any scheme of philosophy.

AND first it appears evident to me, that the moon's influence is necessarily greater on the nervous fluid or animal spirits, than on the blood, or any other fluid of the animal body. For as that fluid is composed of extremely minute, and (as I have shewn elsewhere (*q*)) elastic parts ; it must be the more easily susceptible of the power of any external cause whatever. Wherefore the moon's action will chiefly regard those diseases, which are occasioned by the vitiation of those spirits.

OF

(*q*) See *Introduction to a mechanical account of poisons*, 4th edit.

OF this class none seem more remarkable than *epileptic diseases*, which, besides the other difficulties, with which they are attended, have this also surprizing, that in some the fits do constantly return every new and full moon. *The moon*, says *Galen* (r) governs the periods of epileptic cases. Upon this score, they, who were thus affected, were by the greek writers sometimes called Σεληνιακοὶ (s), and in the histories of the gospel Σεληνιαζόμενοι (t), and by some of the *Latins* afterwards, *Lunatici* (u).

AND indeed, I myself remember, when I was physician to St. *Thomas's* hospital during the time of queen *Anne's* wars with *France*,
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(r) *De diebus criticis*, lib. iii.

(s) *Alexand. Trallian. lib. i. c. 25.*

(t) *Matth. c. xvii. v. 15.*

(u) *Apuleius de virtutibus herbar. cap. 9. § 65.*

that several of the sailors of our fleets were brought thither, and put under my care for this distemper: most of whom were new men, who had contracted the disease by frights, either in sea-engagements, or in storms. But the moon's influence was so visible on the generality of them at the new and full, that I have often predicted the times of the fits with tolerable certainty. And T. Bartholin tells a story of an epileptic girl, who had spots in her face, which varied both in colour and magnitude, according to the time of the moon. So great, says he, is the correspondence between our bodies and the heavens (x).

MOREOVER, the learned dr. Pitcairne has assured me, that he attended a patient of thirty years of age,

(x) *Hist. anat. centur. ii. bist. 72.*

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age, of a thin habit and somewhat melancholic constitution of body ; who, nine years before, after a considerable hemorrhage from the nose, complained of some humor suddenly rising from his right hand to the top of his shoulder, and then fell senseless on the ground. Upon his recovery from the fit, he felt so great a numbness in that hand, that he could not stir his fingers : and his right arm was violently tossed forward and backward, against his will, for the space of four minutes ; during which time he lost the use of his tongue. And this disorder returned periodically twice every year, in *March* and *September*, that is at the new moon, near the vernal and autumnal equinoxes. The most remarkable particulars of this case were these. First, the paroxysm came on more frequently
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in the night, than in the day time. Secondly, neither his feet, nor left arm, were ever affected by the disorder. Thirdly, the stupor, which constantly remained since the first seizure of the disorder, did never after deprive him of his senses : for he could walk or ride, even when it was at the worst. Fourthly, while the humor was moving up his hand, he could still use his fingers : but when it had got up to the arm, then were they deprived of feeling and motion : afterwards upon its seizing the right side of the head, it occasioned violent convulsive motions of the arm for three or four minutes. Fifthly, at those times when the fit was wont to return, he was sometimes seized with the numbness twice or thrice in an hour ; at other times not above once in two or three days. Sixthly, the

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disease was augmented by warm bathing : for after it, the paroxysms were more violent than usual. Lastly, his memory was remarkably affected about the time of the paroxysm.

THE same gentleman informed me likewise, that he knew several women, who were subject to epileptic symptoms at the new and full moon ; especially pregnant women, and those who stop'd childing early, and whose menstrual purgations left them before the usual time. These were frequently seized by the fit, in their sleep, and sometimes in the day time also. And he remember'd to have cured two young women, whose fits followed the change of the moon ; but they were of that kind of epileptic fits, which are commonly called *St. Vitus's dance*.
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Their gestures were very odd and uncertain, and somewhat like dancing: and they were deprived of speech, during the paroxysm. In fine, other physicians had tried in vain to cure these disorders by *Sydenham's* method (*x*), for want of attending to their monthly periodical returns.

BUT no greater consent in such cases was perhaps ever observed, than what I saw many years since in a child about five years old; in which the convulsions were so strong and frequent, that life was almost despaired of, and by evacuations and other medicines very difficultly saved. The girl, who was of a lusty full habit of body, continued well for a few days; but wa at full moon again seized with a most violent fit: after

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which,

(*x*) *In Schedula monitoria.*

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which, the disease kept its periods constant and regular with the tides. She lay always speechless during the whole time of flood, and recovered upon the ebb. The father, who lived by the *Thames* side, and did business upon the river, observed these returns to be so punctual; that not only coming home, he knew how the child was before he saw it, but in the night has risen to his employ; being warned by her cries, when coming out of the fit, of the turning of the water. This continued fourteen days, that is, to the next great change of the moon; and then a dry scab on the crown of the head, (the effect of an epispastic plaister, with which I had covered the whole *Occiput* in the beginning of the illness) broke; and from the fore, tho' there had been no sensible discharge this way for above a fortnight,

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night, ran a considerable quantity of limpid serum. Upon which, the fits returning no more, I took great care to promote this new evacuation by proper applications, with desired success, for some time; and when it ceased, besides three or four purges with *mercurius dulcis*, &c. directed to be taken about the new and full of the moon, I ordered an issue in the neck, which being thought troublesome, was made in the arm. The patient however grew up to woman's estate, without ever after feeling any attacks of those frightful symptoms.

WHETHER or no it be through want of due heed and inquiry, that we have not, in all the collections of histories and cases, any instance of the like nature so particular as this is, I will not take upon me to assert :

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assert: but to me it seems probable, that when due attention shall be given to these causes, various examples will occur of the same kind of sympathy. In the meantime I cannot think it strange, that some of the ancients, as *Aretæus* has recorded (y), attributed this disease entirely to the moon; and were of opinion, that the deity of that planet inflicted this kind of punishment on wicked people for their crimes, and therefore called it the *sacred disease*.

AND it may not be improper to remark in this place, that the *raving fits* of mad people, which keep lunar periods, are generally accompanied with epileptic symptoms: which was attested to me as a constant observation by the late learned dr. *Tyson*, formerly physician
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(y) *De diuturnis morbis, lib. i. c. 4.*

cian to *Bethleem hospital*, who upon that account usually called such patients *epileptic mad*.

THE *vertigo* is nearly related to the epilepsy according to *Galen* (z), and therefore it was by the ancients called the *little epilepsy*, as *Cælius Aurelianus* relates (a). This at least is certain, that both these diseases are frequently observed to obey the lunar influence: which is confirmed by several cases, that fell under the observation of dr. *Pitcairne*.

Hysterical disorders do likewise partake of the same nature; and therefore a just regard to those periods will contribute to happier success in the cure. One of *Pitcairne's* cases is that of a young married woman, of a fat habit of body, and red-

(z) In aphor. Hippoc. comment. iii. aph. 17.

(a) De morb. chron. lib. i. cap. 2.

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red-haired, who never had her monthly evacuations in a proper quantity. She had for four years past complained of a troublesome weight or pressure on the crown of the head, and of a cold humor at the same time trickling down to her shoulders, with great giddiness and choaking: she also threw up a sharp slimy humor from off her stomach, had a pain and squeezing about her heart, with a difficulty of breathing in the morning at uprising; and these symptoms returned constantly every new and full moon.

Carolus Piso, an accurate writer of medical observations, relates two cases to this purpose; the first of a lady of quality, whose left cheek and part of the neck were wont to swell very sensibly, about the new moon; and this symptom
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was constantly attended with an hysterical suffocation (b). The second was of a girl, who, about each full moon of the spring season, was seized with such obstinate hysterical symptoms, that they continued the whole third quarter. The first day she was convulsed, then she was seized with a loss of speech, and fell into a deep sleep, which lasted two days: and the remaining four days she spent, in doing insignificant things, crying out for help, or in short in a slight delirium, without a wink of sleep (c).

PHYSICIANS have recorded several remarkable instances of periodical palsies. The same Piso gives the following. An aged man was seized with a sleepiness and great lassitude, which was followed

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(b) *De morbis a sero-* | (c) *Obs. 28.*
sa colluvie, obs. 27. |

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lowed by a dead palsy, stupor, loss of memory, and some degree of folly, with a fever. *These complaints returned regularly every new moon for two years; the symptoms gradually lessening, and the last fits had but a faint resemblance with those, he suffered in the beginning (d).*

Tulpius, a very candid and judicious writer, relates a singular case of a shaking palsy, with which a maiden of a pale complexion, and phlegmatic habit of body, was afflicted during the space of three years, not constantly indeed, but with intermissions; each fit lasting near two hours, accompanied with a hoarseness and suppression of voice. The paroxysms manifestly agreed, sometimes with the tides, sometimes with the moon,

moon, and sometimes with the sun : for according to the change of these, the returns were sometimes earlier, sometimes later (e).

THE ancients observed, and every one knows, how great a share the moon has in forwarding those evacuations of the weaker sex, which have their name from the constant regularity they keep in their returns. And there is no question to be made, but the correspondency, which we here observe, would be greater still, and even universal; did not the infinite varieties in particular constitutions, climates, manner of life, and many accidents, one way or other concur to make a difference. It is very observable, that in countries nearest to the *equator*, where we have proved the lunar action

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(e) *Observ. med. lib. 1. cap. 12.*

to be strongest, these monthly secretions are in much greater quantity, than in those near the poles, where this force is weakest. This *Hippocrates* (*f*) takes notice of, with respect to places far north, and gives it as one reason, why the women in *Scythia* are not very fruitful.

THE case being thus with females, it is no wonder, if we sometimes meet with periodical hemorrhages answering to the times of the moon in males also. For as a greater quantity of blood, in proportion to the bulk in *one* sex, is the reason of its discharging itself through proper ducts, at certain intervals, when the pressure of the external air being diminished, the internal *aura* can exert its elasticity; so in the *other*,
if

(*f*) *De aëre, aquis, & locis.*

If at any time there happens to be a superabundancy of the same fluid, together with a weak tone of the fibres; it is plain that the vessels will be most easily burst, when the resistance of the atmosphere is least. And this more especially, if any accidental hurt, or rarefying force has first given occasion to the other causes to take effect.

I HAVE known a young gentleman of a tender frame of body, but otherwise healthy, who having once, by over-reaching, strained the parts about the breast, fell thereupon into a spitting of blood; which for a year and half constantly returned every new moon, and decreasing gradually, continued always four or five days: the fits being more or less considerable, according as his management about

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that time contributed to a greater or lesser fullness of the vessels.

DOCTOR *Pitcairne's* own case is remarkable, both in regard to the disease and its concomitant circumstances. In the year 1687. being at a country seat near *Edinburgh* in *February*, on a fairer day than usual at that season, and the sun looking reddish; he was seized, at nine in the morning, the very hour of the new moon, with a sudden bleeding at the nose, after an uncommon faintness. And the next day on his return to town, he found that the barometer was lower at that very hour, than either he, or his friend *dr. Gregory*, who kept the journal of the weather, had ever observed it: and that another friend of his, *mr. Cockburn*, professor of philosophy, had died suddenly at the same hour by an eruption

ruption of blood from the lungs ; and also five or six others of his patients were seized with different hemorrhages.

WE have two notable instances of the like nature in our *Philosophical transactions* ; the one related by dr. *Musgrave* (g) of a person, who, from his infancy to the twenty-fourth year of his age, had every full moon an eruption of blood on the right side of the nail of his left thumb ; at first to three or four ounces, and after his sixteenth year, to half a pound each time ; which when, by searing the part with a hot iron, it stopped, he fell into a spitting of blood, and by frequent bleeding, &c. was very difficultly saved from a consumption. The other (b) is a story of an inn-keeper in *Ireland*, who from
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the forty-third year of his life, to the fifty-fifth (in which it killed him) suffered a periodical evacuation at the point of the fore-finger of his right-hand; and whenever they endeavoured to stanch the blood, it raised most exquisite tortures in his arm. And altho' the fits here kept not their returns so certain as in the forementioned case, (it may be either from the irregular way of living of the patient, or the mighty change every effusion made in his habit of body, the quantity seldom amounting to less than four pounds at a time) yet there is this remarkable circumstance in the relation, that the first appearance of this *hemorrhage* was at Easter, that is, the next full moon after the vernal *equinox*: which is one of the two seasons of the year, at which we have

have proved the attraction of the air, or diminution of its pressure, to be greater than at any other time whatsoever.

BUT we are besides this to consider, that the static chair, and nice observation taught *Sanctorius*, (i) that *men do increase a pound or two in their weight every month, which overplus is discharged at the month's end, by a crisis of copious, or thick turbid urine.* It is not therefore at all strange, that we should once a month be liable to the returns of such distempers, as depend upon a fullness of the vessels; that these should take place at those times especially, when the ambient air is least able to repress the turgency; and that tho' new and full moon are both of equal force, yet that sometimes one, and

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(i) *Medicin. static. sect. 1. aph. 65.*

sometimes the other only should influence the periods, according as this or that happens to fall in with the inward repletion.

THE *Fluor albus* is a disease equally common and difficult of cure. Of this disease dr. *Pitcairne* has observed a case, which lasted four years: wherein the returns came regularly at every new moon, and the discharge constantly lasted eight days.

ULCERS are liable to various accidents, which render some of them of incertain prognostic: and yet even in these the afflux of humors is sometimes manifestly altered by this power. *Baglivi* (k) was acquainted with a learned young man at *Rome*, who laboured under a *fistula* in the *abdomen*, penetrating
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(k) *De experiment. circa sanguin. Operum* pag. 449.

ing to the *colon*; which discharged so plentifully in the increase, and so sparingly in the decrease of the moon, that he could make a very true judgment of the periods and quadratures of that planet, from the different quantity of the matter that came from him. This reminds me of the case of a young man, who after impure coition first felt a pain in his back, and a weakness and listlessness to walk in his thighs for four days. After this, appeared an ulcer in the *glans penis*, which ran with fetid matter. This flux stop'd spontaneously in about a week; but returned next new moon, and continued so to stop and return for some months; till he was put into a proper course of medicine, whereby he was perfectly cured.

NEPHRITIC paroxysms have frequently been observed to obey the lunar attraction. *Tulpius* (1) relates the case of mr. *Henry Ainsworth*, an *English* minister at *Amsterdam*, who had a fit of the gravel and suppression of urine every full moon; of which he found no relief till the moon decreased, unless by bleeding at the arm. After his death two large stones were taken out of his bladder, and the *pelvis* of the left kidney was enlarged to that degree by the quantity of urine so often stop'd there, as to contain almost as much as the bladder itself. He likewise saw a case of a *capillorum mictus*, which returned periodically every fortnight, with great difficulty of urine, and such uneasiness in the patient's

(1) *Observat. lib. ii. c. 43.*

patient's body, that he could scarcely keep in bed (*m*).

THERE is a fact almost contrary to these related by *T. Bartholin*; who being called to a consultation on the case of *M. Bullichius*, the chief magistrate of *Copenhagen*, found that for some years past he had been afflicted with a periodical *diabetes spuria*, which returned every month with pain after a severe nephritic fit, at or near the full moon; when he made twelve quarts or twenty-four pounds of water, though he had not drank a pint (*n*).

I WAS present, many years since, at the dissection of a child about five years old, who died of the frequent returns of *nephritic* fits,

(*m*) *Ibid. cap. 52.* | *philos. Hafniens. Vol. i,*
 (*n*) *Acta medic. et* | *Obs. 5.*

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fits, attended with vomitings and a *diarrhœa*. The kidneys and ureters were quite stuffed with a slimy calculous matter, and it was very instructive to see the different degrees of concretion in the several parts of it, from a clear limpid water to a milky liquor, which shot into branchy crystals, and these coalescing became a hard friable substance. Dr. *Groenvelt*, who had attended the boy in his illness, observed him to be seized with his pains at every full moon for several months together, which generally ended with the voiding of a small stone or two.

To these nephritic cases I shall add one more, which fell under my own notice. A young lady, fourteen years of age, of a good complexion, was from her infancy afflicted with this odd disorder. A

day or two before the full moon she waxed pale, weak, dejected and melancholy; and then unwittingly discharged a large quantity of urine in her sleep. And this discharge continued five or six nights together: after which it ceased, and then her colour and chearful temper returned. The best strengthening medicines were of no avail, until proper evacuations were thought of and made two or three days before the return of the paroxysm: which prevented the lunar influence.

THAT the fits of the *asthma* are frequently pericdical, and under the influence of the moon, and also of the weather, *Van Helmont* takes notice from his own experience (o). And sir *John Floyer*, who has given us a more particular history

(o) *Asthma & Tuss.* §. 22.

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history of this disease than any other author, observes, that *the fits usually return once in a fortnight, and frequently happen near the change of the moon* (p).

A MORE uncommon effect of this attractive power is related by the learned *Kerckringius*. He knew a young gentlewoman, whose beauty depended upon the lunar force, infomuch that at full moon she was plump and very handsome; but in the decrease of the planet so wan and ill-favoured, that she was ashamed to go abroad; till the return of the new moon gradually gave fullness to her face, and attraction to her charms (q). If this seems strange, it is indeed no more than an influence of the same kind with that, which the moon has

(p) *Treatise of the* |
asthma, p. 17.

(q) *Observat. anatomo-* |
mic. 92.

has always been observed to have upon shell-fish, and some other living creatures. For as the old *Latin* poet *Lucilius* says:

Luna alit ostrea, et implet echinos, muribu' fibras
Et pecui addit --- (r)

And after him *Manilius*:

Si submersa fretis, concharum
et carcere clausa,
Ad lunæ motum variant animalia corpus (s).

THE knowledge of *crises* in *acute diseases* is attended with great difficulties: wherefore it may be very well worth the pains to inquire, what share such an alteration in the weight and pressure of the atmosphere may have in them.

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(r) *Apud A. Gellium, lib. xx. c. 8.* | (s) *Astronomic. lib. ii. vers. 93.*

The ancients made great account of critical days, and regulated their practice in fevers according to the expectation they had from them. This part of phyfic is grown now into difufe, quite flighted, and even ridiculed ; and that I fuppofe chiefly for thefe two reafons. For in the firft place, the earlieft obfervations of this kind, which were drawn into rules, being made in hot eastern countries ; when thefe came to be applied to the diftempers of the colder northern regions, without allowance given for the difference of the climate, they were oftentimes found not to anfwer. And fecondly, fevers of old were treated with few medicines, and chiefly managed by very flender diet : the motions of nature were carefully watched, and no violence offered to interrupt her work. The hifto-

ries therefore of crises, though of great use and certainty under such management as this, were at length unavoidably set aside and lost; when acute cases came to be cured, according to this or that hypothesis, not only by evacuations, but hot or cold alteratives too: there being no longer any room for those laws of practice, which supposed a regular and uniform progress of the distemper.

WHEREFORE, in order to understand a little, both what might induce the first masters of our profession to so nice and strict an observance in this point; and what grounds there may be now, for a more due regard to their precepts, even upon the score of the lunar attraction only; I propose a few remarks, after having premised

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some things proper to be known on this subject.

It is most certain, that *epidemic fevers* are caused by some noxious qualities of our atmosphere ; and therefore it seems reasonable to suppose, that such changes as produce those effects may happen in it in all seasons by the influence of the moon. And this is confirmed by *Ramazzini* in his treatise of the epidemic constitution of the years 1692, 1693, and 1694. in the city and neighbourhood of *Modena*. During these three years a very contagious purple fever reigned. *And it was worthy of observation*, says he, *that the disease raged more violently after the full moon, and especially in the dark quarter ; and abated upon the appearance of the new moon ; as not only I, but other physicians*

physicians here, constantly observed; and this observation was of great service both in the prognostic and cure (t).

'Tis well known, that in solar eclipses the moon is in conjunction with the sun, and in opposition in lunar eclipses: wherefore there is nothing strange in what this same author wonders at in these words. *What happened January 21. 1693. was very surprizing. For the moon having been eclipsed that night, the greatest part of the sick died about the very hour of the eclipse: and some were even struck with suddden death (u).* And the learned *Bal-lonius* relates a fact of the same nature, where he says, that some physicians having met on the case of a lady of quality; while they

(t) *De constit. ann.* | 4to. pag. 97.
1692-3-4. *Mutin.* 1695. | (u) *Ibid.* pag. 98.

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they were actually in consultation, a solar eclipse was at hand. Wherefore, as they thought the patient in no imminent danger, they went out to view the eclipse: but they were soon called back, upon the lady's fainting away, the very instant it began. And she did not recover her senses, till the eclipse was quite over (w).

If physicians had formerly been acquainted with what I have laid down on the moon's influence, I make no doubt but a much greater number of facts of this kind would occur in the histories of epidemic diseases, than we find recorded at present. To those already mentioned let me add one more, which is the more interesting, upon account

(w) *Epidem. lib. i. pag. 48.*

count of the subject of it. It was our great genius and excellent philosopher the lord high chancellor *Bacon*, viscount *St. Albans*; who had this peculiarity in his constitution, that at every lunar eclipse he suddenly fell into a swoon; tho' he did not so much as think or even know of the eclipse; and did not recover, till it was ended (x).

AND it is still fresh in the memories of some, that in that memorable eclipse of the sun, which happened *April 22. 1715*, and in which the total obscuration lasted here at *London* three minutes and twenty three seconds, many sick people found themselves considerably worse during the time: which circumstance people generally wondered at, but I could easily account for.

(x). See *Rawley's life of the right honourable Francis Bacon, Lord Verulam, &c.*

for. In the morning I went with dr. *Halley* and other astronomers to the observatory on the top of the *Royal Society's* house in *Crane Court*, in order to view the eclipse, and consider the state of the weather, and changes that might probably happen in our atmosphere; and then the sun was very bright, and the sky remarkably serene. But when the eclipse became total, the air was so uncommonly cold and moist, that it made us shiver; and the face of nature appeared so extremely gloomy and dismal, that the birds fluttered about in wild affright, and the cattle in the fields stood fixed as statues, through excess of astonishment. Whereas, no sooner had the sun begun to emerge, but every creature assumed so chearful an aspect; that I never saw, nor indeed do I ever expect to see so pleasing a sight.

BUT

BUT to return to the subject of fevers; it is evident that those changes of the air, which affect healthy bodies, must have a considerable effect on weak constitutions, and those labouring under acute diseases. To what has been already said on this head I shall here add, that the *plague* itself is liable to be affected by the moon's action. For *Diemerbroeck*, who has given an accurate description of the plague at *Nimeguen* in the year 1636, observed, *that the contagion constantly increased about the new and full of the moon; and that the greatest part of those, who were then seized, died (y).* Much more may be said on this subject; but it appears too plain, to need further illustration: wherefore I return to the subject of crises.

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FIRST,

(y) *De peste, pag. 9.*

FIRST, all epidemic diseases do in their regular course require a stated time, in which they come to their height, decline, and leave the body free. This is so constant and certain, that when a fever of any constitution, which is continual in one subject, happens, from some other cause, in another to be intermitting; the paroxysms do always return so often, as all together to make up just as many days of illness, as he suffers, whose distemper goes on from beginning to end, without any abatement. Dr. *Sydenham*, a sworn enemy to all theories, learn'd thus much from downright observation; and gives this reason, why autumnal quartans hold six months: because by computation the fits of so long a time amount to 336 hours, or 14 days, the period of a continual fever

fever of the same season (z). So *Galen* takes notice, that an exquisite tertian is terminated in seven paroxysms; because a true continual has its crisis in seven days: that is, the fever lasts as long in one, as in the other; in as much (says he) as *a fit in an intermitting fever answers to a day in a continual* (a). Now this so comes to pass, because,

SECONDLY, in these cases there is always a fermentation in the blood, which goes not off, till the active particles are thrown out by those organs of secretion, which, according to the laws of motion, are most fitted to separate them.

THIRDLY, as different liquors, put upon a ferment, are depurated

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in

(z) *Method. curandi febres* Lond. 1666. 8vo. pag. 100.

(a) *Comment. in aphor. Hipp. lib. iv. aph. 59. & de crisib. lib. ii. c. 6.*

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in different times; so the arterial fluid takes up a determined period, in which it is discharged of an induced effervescence.

FOURTHLY, the symptoms, during this ebullition, do not proceed all along in the same tenor; but, on some days particularly, they give such evident marks of their good or bad quality, that the nature of the ensuing *solution* may very well be guessed at, and foretold by them. Things being thus, those days, on which the disease was so evidently terminated one way or other, were by the ancients called the days of *crisis*; and those, upon which the tendency of the illness was discovered by most visible tokens, the *indices* of the *critical days*.

AND thus far the foundation was good: but when a false theory happened

happened unluckily to be joined to true observations, this did considerably puzzle the affair. *Hippocrates*, it is plain, knew not to what to ascribe that remarkable regularity, with which he saw, that the periods of fevers were generally ended on the seventh, fourteenth, or one and twentieth day. The philosophy of *Pythagoras* was in those ages very famous, of which *harmony* and the *mysteries of numbers* made a considerable part; *odd* were accounted more powerful than *even*, and *seven* the most perfect of all. Our great physician espoused these notions, and confined the stages of acute distempers to a *septenary* progression (*b*): upon which this inconvenience followed, that when a crisis fell out on an even day,

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(*b*) *De septimestri. partu.*

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his measures were quite broken, and he apprehended a relapse (c); and if the fever did not terminate on the seventh, he waited for the fourteenth, and even for the twenty-first day.

BUT whereas the crises of fevers were sometimes observed to fall on the sixth or eighth day of the disease, without any return; *Asclepiades* rejected this whole doctrine as vain (d): and *Celsus*, finding it to be too nice and scrupulous, observes, that the *Pythagorean numbers* led the ancients into the error (e).

Galen, being aware of this, succeeded much better in his reasoning upon the matter; and very happily imputed the critical changes,

(c) *Aphor. sect. iv.* | (d) *Vid. celsum, lib.*
56. | *iii. c. 4.*
| (e) *Ibid.*

es, not to the power of numbers, but to the influence of the moon ; which he observes, *has a mighty action upon our earth, exceeding the other planets, not in energy, but in nearness* (f). So that, according to him, the septenary periods in acute diseases are owing to the *quarterly lunar phases, which are the times of the greatest force, and which return in about seven days* (g). Hence it appears, that Galen hit upon the cause of the changes in the returns and periods of fevers ; but did not so much as guess at the manner of its producing the effect.

THE result of the whole affair in short is this. A *crisis* is no more than the expulsion of the morbid matter out of the body, through

(f) *De diebus decretor. lib. iii.*

(g) *Ibid.*

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through some or other of the secretory organs; in order to which, it is necessary that this should be prepared and comminuted to such a degree, as is required to make it pass into the orifices of the respective glands. And therefore, as the most perfect crisis is by sweat, (both by reason that the subcutaneous glands do naturally discharge more than all the others put together; and also that their ducts being the smallest of any, whatsoever comes this way is certainly very well divided and broken) so the most imperfect is a hemorrhage: because this is an argument, that what offends is not fit to be cast off in any part, and consequently breaks the vessels by the effervescence of the blood. An abscess in those organs, which separate thick slimy juices, is of a middle nature betwixt these two.

Now

Now it is very plain, that if the time, in which either the peccant humor is prepared for secretion, or the fermentation of the blood is come to its height, falls in with those changes in the atmosphere, which diminish its pressure at the new and full moon; the crisis will then be more compleat and large: and also, that this work may be forwarded or delayed a day, upon the account of such an alteration in the air; the distension of the vessels, upon which it depends, being hereby made more easy, and a weak habit of body in some cases standing in need of this outward assistance. Thus a fever, which requires about a week to its period, may sometimes have a good crisis on the sixth, and sometimes not till the

O eighth

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eighth day, as *Hippocrates* has observed.

IN order therefore to make true observations of this kind, the time of invasion is to be considered; the genuine course of the distemper must next be watched, which is not to be interrupted by any violent methods; the strength of nature in the patient is to be attended to, and by what secretions the crisis is most likely to be performed: and it will then be found, that not only the new and full moons, but even the southings, whether visible or latent, of the planet, are here of considerable moment.

To conclude, this powerfull action of the moon is observed not only by philosophers and natural historians, but even by the common

mon people, who have been fully persuaded of it time out of mind. *Pliny* relates, that *Aristotle* laid it down as an aphorism: *that no animal dies but in the ebb of the tide* (*b*). And that births and deaths chiefly happen about the new and full moon, is an axiom even among women. The husband-men likewise are regulated by the moon in planting and managing trees, and several other of their occupations. So great is the empire of the moon over the terraqueous globe.

(*b*) *Hist. nat. lib. ii. cap. 98.*





C H A P. III.

Of the benefits accruing to the practice of physic from this theory.

IT is now time to inquire, what use may be made of these observations in practice. And first, they must be of service in predicting the returns of the paroxysms, and the issue of the disease; which will gain reputation to the physician, and give confidence to the patient. But I will endeavour to shew, that they will be of greater service still, in contributing towards the cure of diseases. In order to which I will first lay down some general remarks, and then descend to particulars.

It seems pretty evident, that all diseases, whose returns answer
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to the changes of the moon, arise from repletion. For as the moon's action produces its effect by distending the vessels only; it is manifest, that plenitude alone can increase this distension, whether it happen by the quantity of the fluids, or their effervescence. And therefore all diseases, which return but once or twice in a month, and are increased by the moon's influence, require evacuations: which must diminish at least, if not cure the disease. But as regard is to be had to the nature of the distemper, and the time and manner of the evacuation; it is necessary to establish some rules on each of these heads.

FIRST then, we are to consider, whether the disease lies in the blood-vessels, or in the vicious quality

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quality of the fluids separated from the blood, and conveyed to some principal part of the body. In the first case we should lay the greatest stress on phlebotomy ; in the second, on proper medicines for correcting the taint of the fluids. Besides, as we know by experience, that evacuations are to be made by the way, which nature points out ; great attention must be given to finding out that way in every particular disease. Then the best time for evacuating is in most cases a little before the paroxysm or exacerbation : not only because its violence is thereby obviated, but likewise because the humors then turgid will flow out of the body with more ease, and in greater plenty. And in order to make this matter better understood, I will add some few practical remarks

remarks on the diseases mentioned in the foregoing chapter.

THE *epilepsy* is extremely difficult to be cured in adults, but in children it is the reverse. And that evacuations, especially by a blister laid to the back part of the head, are of great use here, is plain from a case above related (i); which not only confirms the assertion of *Panarolus*, who says, *that he cured a boy of seven years of age, who had been speechless, stupid, and epileptic, by a blister applied to the coronal suture* (k); but proves the goodness of *Celsus's* advice, *to apply cupping glasses with scarification to the occiput; and besides to apply the actual cautery in two places, one in the occiput, and the other lower down in the neck upon the*

(i) Pag. 43.

(k) Obs. med. pentecost. iv. obs. 30.

the first vertebra ; in order to have a plentiful drain of the noxious humor (l). For the head is the chief seat of diseases of this kind : frequently occasioned in children by plenitude, and the lentor of the blood, which has not been comminuted by bodily exercise, or the action of the lungs ; and in adults by a redundancy of humors, falls, or sudden frights. In this obstinate disease the most proper medicines for correcting the juices, seem to be native cinnabar, and more especially wild valerian root, before it has shot out its stalk ; pulverized, and given frequently in a due quantity. For my part, I have several times found them both very successful ; and for the virtues of the last, I particularly recommend the reader to
Pana-

(l) *Lib. iii. cap. 23.*

Panarolus (*m*), and the famous botanist *Fabius Columna* (*n*). However it must not be forgot, that this disease owes it origin to so many different causes, and is bred in so many different constitutions of body; that the same remedy, which succeeds in one case, often fails in another: and therefore different medicines are to be tried, especially on adults. And great regard must be had to the times, in which the paroxysms most usually return, in order to effect a cure.

THE *vertigo* is likewise cured by these same medicines. But the patient must be vomited now and then, and blistered on the head or neck. This is a disease of the eyes, and generally arises from too great tension of the extremities of
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(*m*) *Obs. med. pen.* 1. |
obs. 33.

(*n*) *Phytobas.* p.
120.

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the small arteries, as *Bellini* has demonstrated: wherefore it is no wonder, if it should follow the changes of the moon.

Hysterical disorders are cured much in the same manner. But they seldom require bleeding, and purging should be used with caution. Emetics are of greater service, especially a little before the fit. For in the fit the best medicines are those, which repair the loss of spirits, as *gum ammoniac*, *Russian castor*, *salt of amber*, in pills, and the like. And in most of those cases, care must be taken to adapt the medicines to the usual way of living of the patient, and to the affections of her mind.

The monthly returns of *paralytic disorders*, which are sometimes observed, are owing to the source of the disease, which is generally

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nerally the head: in which the serofities of the brain being extravasated, attack the origin of those nerves, where they happen to lodge, and cause a palsy of this or that part. Hence it is, that this disease is very often the consequence of an apoplexy, under the shape of a general palsy, or that of one side only. But when this disorder is occasioned by an external injury done to the nerves, or by internal tumors, then it observes no regular periods. The cure is to be begun by evacuating the redundant phlegm, which in most cases is best done by stool; and then an eye must be had to the return of the distemper, not only by putting the patient into a course of attenuating medicines, as the *horse radish root*, *wild valerian root*, *mustard seed*, and such like; but also of cold bathing, if

his age and strength will allow it : for this remedy is not so beneficial for old folks, as for young; but as it braces up the relaxed fibres, and promotes urine, it is proper for this disease in both these respects. For this reason the ancients, according to *Caelius Aurelianus* (o), ordered their paralytic patients to swim in the sea, or to undergo the cataractical course, by the fall of water from on high on the weak parts; on account of the greater weight of salt than fresh water, and the more intense cold of falling than still water.

St. *Vitus's dance* is generally called a convulsive disorder; but I look on it to be rather paralytic, and to take its rise from a relaxation of the muscles, which being unable to perform their functions
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(o) *De morb. chronic. lib. ii. cap. 1.*

in moving the limbs, shake them irregularly by jirks. And it is for the most part but a slight evil, and commonly seizes weak habits of body; girls more frequently than boys, and seldom adults. Wherefore I never found it difficult to be cured by the cold bath and chalybeate medicines.

THE disorders of the *monthly evacuations* of the fair sex require our serious consideration. As the excess of them generally proceeds from an acrimony in the blood, so the defect is chiefly owing to a *lensor*. For this flux is seldom suppressed for want of a sufficient quantity of blood: such wonderful art has the all-wise author of nature employ'd in making full provision for an evacuation, equally requisite for the health of the individual, and the propagation of human

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human kind. Wherefore, as in immoderate discharges regard should be had to the times, when the effervescent humor can the more easily burst thro' its vessels, according to the doctrine already laid down; in order to make a revulsion at those times, by drawing blood from parts the most distant from the seat of the distemper; so when a suppression of the *menfes* requires blood-letting, *Vander Linden's* caution is to be observed, which is recommended by *Etmuller* (p), and rationally accounted for by dr. *Freind* (q). Moreover, as the Peruvian bark is very powerful in allaying the effervescence of the blood, whereby the vessels are distended; it will be very proper to give it plentifully some few days

(p) *Tom. iii. pag. 442. edit. 1736.* | (q) *Emmenalog. pag. 103.*

days before the time, that too great a discharge is apprehended.

THE same method is to be observed in all periodical *hemorrhages*, giving those medicines at the same time, which restringe and brace up the fibres: of which the best are *burnt alum*, with a fourth part of *sanguis draconis*, as I have found by repeated trials.

AND it is worthy of remark, that so great is the moon's influence in cases of this nature, that upon the suppression of these evacuations from one part, the blood forces its way through some other part: which was the case of the young gentleman, mentioned above (r). For when his spitting of blood was stop'd by the medicines just now recited, he was at the
same

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same stated times seized with a bleeding at the nose, which gave me no apprehensions, as the principal organ was no longer affected.

AND this action of the moon extends even to those quadrupeds, that are menstruated; for it has been observed, that they generally have those evacuations about the new moon: in particular mares and monkeys, and that so constantly, that, according to the testimony of *Horus Apollo*, the Egyptians painted the *Cynocephalus* to represent the moon, upon account of a certain sympathy, whereby the female of this animal has evacuations of blood from the uterus at the new ~~and full~~ moon: and they kept monkeys in their temples, in order to point out the times of the conjunction of the sun and moon (s).
Where-

(s) *Hieroglyphic. vid. Gesner. de Simiis.*

Wherefore the moon's influence is apparent in all animals; provided irregularities in their way of living do not prevent it.

AND this theory accounts for the periodical returns of the *fluor albus*, which are sometimes observed, especially if the discharge be from the uterine vessels: for it issues sometimes from these, and sometimes from the glands of the *vagina*. In the first case, it stops upon the menstrual purgations; in the latter, it flows with them, and continues even in pregnant women.

RUNNING *ulcers* are likewise comprehended in this doctrine, it being no way surprizing, that the forementioned causes should increase the discharge of *pus*, especially in those parts, where the lax pliant texture of the body makes little or no resistance to the

Q distensi-

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distension of the vessels. Hence in ulcers of the head it has been found, that the patients are in great danger at the new and full moon.

THE best method of treating *nephritic pains*, is to begin by blood-letting. And it will be of service to the patient, to observe, when the paroxysms are wont to return, and to empty the vessels, at the time, which threatens the greatest danger. For it is well known, that this disease is partly occasioned by the compression of the small ducts of the kidneys from the fullness of the capillary arteries; which fullness is increased by the new and full moon. Whence I have more than once wondered, that the chief bent of the writers on this disease is, to drive down the gravel into the ureters and bladder.

bladder : whereas the dissection of dead bodies has taught me, as I have mentioned before, that the first rudiments of a *calculus* are a very limpid *serum* in the *caruncles* of the kidneys ; and that this may harden to the consistence of stone, will not seem strange to those, who are acquainted with the attractive force of salts in solution, and with the effects of obstructions in the capillary vessels. And hence it is, that *calomel* given now and then is of greater service in the beginning of this disease, than any diuretics : because this medicine removes the obstructions of the minute vessels, and thus prevents the cohesion of saline particles, which is frequently the consequence of such obstruction. Moreover, daily experience shews, that too free an use of diuretics is prejudicial in diseases of the kid-

neys. Which observation has not been sufficiently attended to by some physicians, who not only patronized a certain monstrous jumble of a medicine, till the legislature was wrought on to purchase the secret at an immense price ; but still go on to drench their patients with it, and thereby injure the stomach, kidneys, and bladder.

Asthmatic disorders are likewise heightened by the lunar action, both on account of a lesser quantity of air taken into the lungs in each inspiration, and of the distension of the vessels by the rarefied blood : wherefore the returns of the fits are to be observed, and guarded against by moderate evacuations, as blood-letting, gentle vomits, laxatives, and sometimes cathartics. But every thing that heats

heats the blood, should be carefully avoided, especially about the usual times of the paroxysms: because there is generally then a lurking fever; which ought not to be exasperated by heating food or medicines. Upon this score *Hippocrates* advises persons labouring under difficult breathing, to abstain from clamors and anger (t). And *Van Helmont* observed, that *asthmatic paroxysms* return more frequently in summer than winter (u). For which reason, the proper medicines in this disease, besides those above mentioned, are such as are cooling, and at the same time promote urine; as *vinegar of squils*; *spirit of nitre*,; *gas sulphuris*, which is water saturated with the fumes of sulphur; and several others

(t) *Epidem. lib. vi.* |
sect. 4.

(u) *De asthm. et*
tussi.

others of the same nature, enumerated by sir *John Floyer*.

To what has been said above on *crises in acute diseases*, it may be worth while to add this one remark. Although great care should be taken, not to raise any commotion in the humors on the coming on of a crisis; yet there are cases, in which there is a necessity of making some evacuations: as for example, if the fever runs very high, the humors are so agitated, that no secretions can be performed. In this circumstance phlebotomy is so far from obstructing, that it promotes the crisis: in the same manner, as in the small pox and measles, before any appearance of the pustules, when the turgescence of the humors is excessive, taking away some blood facilitates

facilitates and hastens the eruption.

THE case is much the same with *critical abscesses*, wherein the fullness and feverish heat are sometimes so great, that they require moderate evacuations, either by bleeding, or purging. For it is to be observed, that the reason, why the ancients condemned purging in fevers, was, that the most of their cathartics were very violent; as *scammony*, *black hellebore*, *juice of spurge*, and others of the like acrid nature: upon which account they contented themselves with emptying the intestines by clysters. But as we have always a good stock of gentle cathartics, we may safely give them at any time of the disease, without the least apprehension of heating the body; especially if nature points out this way, as she frequently does.



COROLLARY.

Wherein the preceding reasoning is confirmed by observations of the effects of storms on the human body.

AS we have endeavoured to prove in the begining of this treatise, that the celestial motions, which occasion certain distempers, and their periods or returns at stated times, are likewise able to raise winds; and that we feel the different effects of these, according as other causes concur to put the air into violent agitations: it may not be amiss to give some few instances, how much this reasoning is confirmed by facts.

ON the twenty-sixth of *November*, 1703, there arose a most
furious

furious storm of wind a little before midnight, which lasted upwards of six hours. The history and whole theory of this wonderful phænomenon I shall not attempt to compile. This province was by the Royal Society conferred on the learned dr. *Halley*, who was every way equal to the task. Wherefore I shall only touch on some circumstances of it, which more immediately relate to the present theme.

THE moon was then in her *perigeum*, and near the change : and it has been proved above, that both these circumstances contribute towards attracting the air upwards, and raising winds (*w*). Accordingly, the barometer was lower than usual (*x*), and the subsequent

R tides

(*w*) Pag. 9, 10. | (*x*) *Phil. transf.* No: 289.

tides were very high. And most probably there was a concurrence of one or more of the other causes already assigned (*y*), tho' it might be difficult to come at the knowledge of them: but as the state of the weather in the preceding seasons of the year is of easier, and perhaps not less useful, consideration; I shall remark, that in those places particularly, which felt the rage of the storm, the summer and part of autumn were remarkably wet; and the winter was ushered in by open warm weather; so that a thermometer, (whose freezing point was about eighty four) was very seldom below a hundred to the latter end of *November* (*z*). Hence we may form a probable conjecture, that the atmosphere was blended with vast quanti-

(*y*) *Pag.* 24, 25.

(*z*) *Phil. trans. No.*
| 289.

quantities of saline and sulphureous exhalations ; which, by their various combinations and agitations, at length gave that destructive force to the motion of the air. And this conjecture is confirmed by the flashes or coruscations, which were observed during the storm ; and by the saline particles found the next day on the leaves of vegetables, even at many miles distance from the sea : where the grass in some places tasted so salt, that the cattle did not care to eat it.

INSTEAD of prosecuting this subject farther, I think it may not be amiss to subjoin this remark ; that as the new or full moon is capable of causing those alterations in the human body, which we have already mentioned, even when it is not seconded by any

other cause; so if it be accompanied with a tempestuous state of the weather, the effects will be the more sensibly felt. And indeed I my self remember, that several persons complained particularly of head-achs the very night of the storm. But the case of a lady of quality of my acquaintance is very remarkable, who was struck blind in an instant that same night. Her blindness was the *ἀμαύρωσις* of the *Greeks*, or the *gutta serena* of the modern physicians: and as this is a distemper, which does not seem to me to be sufficiently understood, I will offer my thoughts on it in few words.

THE cause of it is generally either an obstruction and subsequent distension of the capillary arteries of the *Retina*, or some injury done to the optic nerves. In
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the first kind, which is vastly the more common, the sight is darkened gradually; in the last, the sight is lost, sometimes sooner, sometimes later, according to the cause, and sometimes infine in an instant. For the optic nerves are injured many ways, and rendered incapable of performing their office: as by a blow, fall, fracture or depresso of the skull they are often compressed; in convulsions they are sometimes loaded with extravasated humors: and not uncommonly they are seized with a sudden palsy. And in the dissection of persons, who had been long afflicted with epilepsies, I have observed, that the optic nerves were pressed on by an extravasated lymph collected just over the place, where after their junction they separate, to run to
the

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the eyes: and in paralytic disorders I have found the fibres in that place wasted and dry.

I COULD produce a number of observations from medical writers in confirmation of this theory: but I believe the following few may suffice. *Felix Platerus*, a physician of great experience, observed, in the dissection of a dead body, a tumor, resembling a gland, lying on the optic nerves, and obstructing the passage of the animal spirits to the eye (a). *Guernerus Rolfincius* found both the optic nerves wasted, in the body of a woman, which he opened (b). *Johannes Scultetus* (c) saw the optic nerves wasted to half their usual size, in the body of a woman, who had had a
gutta

(a) <i>Observat. lib. i.</i>		(c) <i>Armament. chir.</i>
(b) <i>Dissert. anat.</i>		<i>rurg. obs. 36.</i>
<i>lib. iv. cap. 31.</i>		

gutta serena for twenty years. And the *Ephemerides naturæ curiosorum* contain the unfortunate case of a young girl, who, from a blow on the left part of the head, was seized with a fever and delirium, then lost her sight, and died soon after. Upon opening the head, a great quantity of limpid serum was found in the ventricles of the brain, especially forwards, where it entirely compressed the optic nerves (d).

Now as to the case of the lady struck blind during the storm, I think it no difficult task to account for that misfortune upon the foregoing principles, by saying, that the moon's action, vastly increased by the concurrence of the storm, was capable of obstructing the passage of the animal spirits to the optic nerves in a tender constitution,

(d) *Vid. miscellan. curios. anni 1686.*

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tution, as effectually as if these nerves had been cut through; and consequently of giving rise to the *gutta serena*.

CONCERNING the use of this theory, I can safely say, that it has pointed out to me the true method of treating this distemper, which before my time was generally esteemed incurable: and as the true knowledge of the causes of diseases is a sure foundation for practice, so I have succeeded in a number of trials on cases of this kind. Wherefore when the capillary arteries are the seat of the disease, the proper medicines are those, which most effectually attenuate the viscid humors, and remove the obstruction: and such are the chemical preparations of mercury. And these are to be continued a good while, and frequently

frequently even to raising a salivation, which is to be kept up twenty or thirty days.

BUT when the disease proceeds from a defect in the nerves, it requires a different method of cure from the preceding one; and is to be varied according to the injury, which the nerves have received. But it plainly appears from what has been said, that this species of the *gutta serena* is generally incurable. For who, but the almighty maker, can pretend to restore to the optic nerves their natural tenor, either when obstructed, or their cavities streightened by a viscid sluggish humor, or when wasted and shriveled up; or to make a free passage for, and give a due impulse to the animal spirits, when those nerves are become paralytic? But if any hopes remain,

S

while

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while the disease is yet recent, a caustic is to be applied to the crown of the head, over the meeting of the coronal and sagittal sutures; and then the *periosteum* is to be laid open, to make an outlet for the noxious humor from the brain. And this ulcer, like common issues, must be kept open with peas, and continued a long time: in the mean while the patient is to be put into a course of nervous cephalics, as *wild valerian root*, *Russian castor*, *gum ammoniac*, *asa foetida*, *volatil spirits* and *salts* of the animal tribe, &c.

BUT to return to storms: there happened a most violent one in *England*, on the third day of *September* 1658, the day of the death of *Oliver Cromwell*. As we have no journals of the weather for that year, that ever came

to my knowledge, I can say nothing of the preceding state of the air. But this is remarkable, that the storm happened near the autumnal equinox, and about the full moon: which concurrence of causes is very well adapted to stir up great commotions in the atmosphere. However that be, it is to be observed, that the disease of that great man was of that kind, which we have shewn to be particularly under the moon's influence. For it is upon record, that he died of a fever accompanied with grief, from the unhappy state of his domestic affairs: and it is very certain, that grief disposes the animal spirits to be easily affected by causes of this nature.

BUT to come to a conclusion of this little work; it has been observed of those countries, which

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are subject to inundations, that these calamities generally happen at the times, when the moon's action is most powerful: so that the learned *Baccius* (e) seems to have reason for his conjecture, that the chief cause of these evils is to be sought for in excessive high tides, with the unhappy concurrence of the attractive faculty of this or that planet.

SUCH are the natural causes of storms and hurricanes: but as to the question of the divine power, whether or no the wrath of the Almighty sends these calamities on mankind, contrary to the ordinary course of nature, I will not take upon me to determine, who have no intention to disengage men's minds from the bands of religion. For tho' I am thoroughly convinced,

ed,

(e) *Del Tevere, lib. iii. p. 228.*

ed, that each part of the universe is constituted and moved by certain laws; and that the same disposition of the fabric, which is the most convenient for the whole, sometimes brings inconveniencies and even destruction in some particular places: yet it is highly equitable, that the omnipotent creator should be allowed to have an absolute dominion over all his works. And possibly it was agreeable to the divine wisdom to create the world in such a manner, that natural causes should now and then produce evils and inconveniencies on mankind; whom it was necessary to affright with storms, thunder, and other extraordinary phenomena, in order to keep them in a continual sense of their duty.

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STATUTES

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ERRATUM.

Page 96. line 19. for *new and full moon*, read
new moon.





F

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